REMARKS

Claims 1, 3, 7, 9-10, 12-13, 15-21, 23-25, 27-31, 42, 44-45, 48 and 49 were pending in the application prior to the present amendment. Claims 3, 12 and 44 are herein canceled. Claims 1, 10, 13, 17, 19, 21, 31, 42, 45 and 48 are herein amended. Claims 50-53 are herein added. Thus, claims 1, 7, 9-10, 13, 15-21, 23-25, 27-31, 42, 45 and 49-53 will be pending in application after entry of the present amendment.

Section 101 Rejections

Claims 13, 21, 31, 42 and 48 were rejected under 35 U.S.C. 101 as being directed to non-statutory subject matter. In particular, the Examiner states:

> [t]hese claims are drawn to an abstract idea because they recite[] a series of steps that are not tied to any of the statutory classes even though their[] preamble recites 'a computer-implemented method'. These steps can still be interpreted as manually computed.

Applicant respectfully disagrees with these rejections. However, in order to expedite the application towards an allowance, Applicant has amended each of claims 13, 21, 31, 42 and 48 (among others) to recite a "computer system" performing the various actions recited in those claims. Thus, the 101 rejections are overcome.

Art-Based Rejections

The pending claims were rejected under 35 U.S.C. 103(a) as being unpatentable in view of various combinations of:

> Begg et al. ("Improving Investment Decisions Using a Stochastic Integrated Asset Model, SPE 71414, SPE Annual Technical Conference and Exhibition, 9/2001);
>
> Netemeyer et al. (U.S. Pub. No. 2002/0169785);
>
> Voit et al. ("Random Number Generation from Right-Skewed, Symmetric, and Left-Skewed Distributions", Risk Analysis, Vol. 20, No. 1, 2000);
>
> Jalali et al. (U.S. Pub. No. 2002/0177955 A1); and
>
> Joshi et al. (Techno-Economic and Risk Evaluation of a Thermal Recovery Project, March 1996, Prepared for Department of Energy).

In particular, claims 1, 3 and 49 were rejected based on Begg in view of Netemeyer and Joshi. Claims 7 and 9 were rejected based on Begg in view of Netemeyer, Joshi and Voit. Claims 10 and 12 were rejected based on Begg in view of Netemeyer and Voit. Claims 13 and 15-16 were rejected based on Begg in view of Netemeyer and Joshi. Claims 17-21, 23, 25, 27 and 29-30 were rejected based on Begg in view of Netemeyer and Jalali. Claim 24 was rejected based on Begg in view of Netemeyer, Jalali and Voit. Claim 28 was rejected based on Begg in view of Netemeyer, Jalali and Joshi. Claim 31 was rejected based on Begg. Claims 42, 44-45 and 48 were rejected based on Begg in view of Netemeyer and Jalali. Applicant respectfully disagrees with these rejections.

Claim 1 is patentably distinguished over the cited references at least for the following reasons.

First, none of the cited references suggest using "a high-resolution geocellular reservoir model" having "one or more variables" as part of a method involving repeatedly "selecting values" of the "variables" to create an "instantiated" model, "assembling" a workflow including the instantiated model, and executing "one or more simulation engines on the workflow". The Examiner asserts that the claimed "geocellular reservoir model" is taught by Begg at page 5, col. 2, section entitled "Calibration", paragraph 1.[1] Applicant respectfully disagrees. The cited paragraph reads as follows:

> **Calibration**. We can go beyond mere uncertainty estimates and try to calibrate the simplified component models. The aim here is to improve the fidelity with which the simplified models represent the real world, rather than assess the uncertainty in their input parameters. We will use the calculation of OOIP of the resource as an example. Assume the simplified model consists of a straightforward geometrical-body representation, of the volume to be exploited. This could be as simple as a cylinder for an in-fill well or a combination of bodies that represent a whole field. Rather than use average property data from the wells (porosity, saturation, etc) as input to calculate the OOIP of the simple model, we can back out "effective" properties from a multi-million geo-cellular model that incorporates all the information about structure, fluid contacts property trends and their correlations. In this case the simple model's GRV, OOIP, HCPV etc will match exactly those of the rich model. Uncertainties can

[1] See Begg the Office Action at page 4, second paragraph of section 3.

> then be assigned to these effective values, as above, recognizing dependencies between them. [*Emphasis added*]

This paragraph teaches that a "rich model" such as a "multi-million geo-cellular model" may be used to "calibrate a "simplified model" such as a "geometrical-body representation" of the "volume to be exploited". However, Begg never suggests using "a high-resolution geocellular reservoir model" that has "one or more variables" in a process that includes repeatedly "selecting values of the variables in their respective ranges." To the contrary, the models used in Begg's system are "***simplified*** component models for each domain."[2] Begg emphasizes that:

> An iteration of the overall model should execute **in order of 1 second** to enable full investigation of uncertainties, options and scenarios. Component models therefore need to have a rich set of input parameters, be **relatively low on sophistication/rigor** and execute quickly.[3]

Furthermore, Begg teaches that "[t]he goal of rapid execution requires that the component models of each domain be fairly simple" and that "[m]ulti-million cell models of the subsurface and recovery dynamics, or full surface-facility process-models **violate this criterion**." (*Emphasis added.*) Thus, it is apparent that Begg advocates *against* the use of a "high-resolution geocellular reservoir model" as part of the SIAM system. Therefore, the Examiner's reliance on Begg to teach the claimed "geocellular reservoir model" is fundamentally mistaken.

Second, claim 1 also recites "wherein the one or more simulation engines include one or more physics-based flow simulators for simulating reservoirs, wells and surface-pipeline hydraulics." The Examiner acknowledges that Begg does not teach this feature, but alleges that Netemeyer does.[4] While Netemeyer includes a discussion of "reservoir simulation" in his "Background of the Invention" section (see paragraphs 4-7), Begg's emphasis (as described above) on the importance of "simple component models" that are "relatively low on sophistication/rigor" runs contrary to any attempt to modify Begg by adding a "physics-based flow simulator" to the SIAM system. A physics-based flow simulator is by definition one that attempts a rigorous simulation of the "physics"

[2] See Begg at page 1, left column, "Summary" section, lines 13-14. (Emphasis added.)
[3] See Page 3, left column, "Components of the SIAM System", second bullet point. (Emphasis added.)

behavior that occurs within a physical system. Thus, one of ordinary skill would have absolutely no motivation to modify Begg, as the Examiner has suggested, to include a "physics-based flow simulator".

Therefore, claim 1 and its dependents are patentably distinguished over the cited references at least for these reasons.

Claims 10, 13, 17, 19, 21, 42 and 48 each recite features similar to those discussed above with respect to claim 1. Thus, these claims and their dependents are patentably distinguished at least for reasons similar to those given above.

In addition to the reasons given above, Claim 17 is patentably distinguished over the cited references at least for the following reason. Claim 17 recites "execut[ing] a well-perforator program" as part of a process that involves "repeatedly perform said selecting, said executing the well-perforator program, said assembling the instantiated models and the perforation locations, and said executing the one or more simulation engines". As noted above, Begg especially emphasizes that the stochastic integrated asset model (SIAM) relies on model "simplicity" and fast iteration speed. Thus, one of ordinary skill would be strongly motivated to resist any modification of the SIAM system that would involve adding a "well-perforator program" to the SIAM system. Therefore, claim 17 is additionally distinguished over the cited references at least for this reason. Claims 19, 21, 42 and 48 each recite a feature similar to that recited above with respect to claim 17. Thus, these claims are additionally distinguished over the cited reference based on similar reasoning.

Claim 31 is believed to be patentably distinguished over the cited references at least for the following reasons.

First, claim 31 recites "wherein the first set of models and planning variables includes at least one **high-resolution geocellular reservoir model**." As discussed

[4] See Office Action at page 5, lines 3-6.

above, Begg teaches against using "rich models" such as high-resolution geocellular reservoir models as "components of a value chain".

Second, claim 31 recites "assembling a second case by receiving second user input specifying modifications to the first set of models and planning variables and modifying the first set of models and planning variables according to said second user input." As evidence for the anticipation of this feature, the Examiner points to Begg pages 6-7, the section entitled "Scenario Analysis". That section describes the distinction between "scenario analysis" and "sensitivity analysis" from the point of view of Begg's SIAM system. For example, that section asserts:

> We characterize scenario analysis as the evaluation of discrete and significantly different alternatives whereas sensitivity analysis is more like variations on a theme. This applies to both uncertain variables ("state-of-the-world" scenarios) and decision variables (alternative choice scenarios).

However, the fact that Begg's system can perform scenario analysis and sensitivity analysis, and recognizes a distinction between the two, does not in any sense suggest an ability to "assembl[e] a second case" by "modifying" the "set of models and planning variables" of a first case according to "user input". Indeed, the cited section has nothing to say regarding "modifying" models or planning variables. The fact that Begg's "Monte Carlo engine" can explore different values of a sensitivity "variable" or different scenarios of a "decision tree" has nothing to do with "modifying" a model or planning variable according to user input. Furthermore, Applicant observes that the Examiner's argument is noticeably lacking in any attempt show how the teachings of the cited section map onto the language of the quoted claim feature. (The Examiner's argument relative to this feature constitutes nothing more than a citation.)

Third, claim 31 recites "storing the first case, the second case and the modifications to the first set of models and planning variables in a memory medium." As evidence for the anticipation of this feature, the Examiner points to Begg page 5, left column, paragraph 3. While that passage refers to "persistent data storage", that passage has absolutely nothing to say about storing a "case" comprising "models and planning variables" or storing "modifications" to a set of models and planning variables. Thus, the Examiner's argument regarding this feature is misguided.

Fourth, claim 31 recites "displaying an indication of the first case, the second case, and a parent child relationship between the first case and the second case." Regarding this feature, the Examiner asserts:

> Begg does not teach displaying an indication of the first case, the second case, and a parent child relationship between the first case and the second case. However, with the teaching of data structure keeping track of the data associated with the scenarios among scenarios taught on page 5 col. 1 paragraph 3 and the capability of graphically displaying diagram, taught on page 4 col. 2 last paragraph and page 5 col. 1 paragraph 1, one of ordinary skill in the art would have been able to generate a display for indication of the first case, the second case, and a parent child relationship between the first case and the second case to understand the structure of decision by clearly identifying dependencies.

This assertion is false. Begg teaches that the SIAM system "must support the ability to track the input/output data associated with alternative scenarios and options within a scenario."[5] However, the ability to track data associated with alternative scenarios and options within a scenario is irrelevant to the notion of displaying "a parent child relationship between [a] first case and [a] second case" as claimed. Begg never suggests the disclosed "tracking" involves anything connected with a "parent child relationship", or, any sort of relationship between "cases" that comprise "models and planning variables." Furthermore, Begg teaches that "graphical influence diagrams can be used to understand the structure of the decision by clearly identifying dependencies."[6] Those dependencies appear to be dependencies between "input and output parameters" (see page 4, right column, the paragraph immediately preceding the "User and Data Interaction" heading). However, Begg never suggests that the "graphical influence diagram" comprehends any sort of "parent child relationship" between cases, i.e., cases that comprise "models and planning variables" as claimed. Thus, the passages cited by the Examiner have nothing to do with the above-quoted "displaying" feature.

[5] See Begg page 5, left column, second full paragraph, lines 4-6.
[6] See Begg, at the sentence that bridges between pages 4 and 5.

CONCLUSION

Applicant submits the application is in condition for allowance, and an early notice to that effect is requested.

If any extensions of time (under 37 C.F.R. § 1.136) are necessary to prevent the above-referenced application(s) from becoming abandoned, Applicant(s) hereby petition for such extensions. The Commissioner is hereby authorized to charge any fees which may be required or credit any overpayment to Meyertons, Hood, Kivlin, Kowert & Goetzel P.C., Deposit Account No. 50-1505/5460-01101/JCH.

Also filed herewith are the following items:

☐ Request for Continued Examination

☐ Terminal Disclaimer

☐ Power of Attorney By Assignee and Revocation of Previous Powers

☐ Notice of Change of Address

☐ Other:

Respectfully submitted,

/Jeffrey C. Hood/

Jeffrey C. Hood, Reg. #35198
ATTORNEY FOR APPLICANT(S)

Meyertons, Hood, Kivlin, Kowert & Goetzel PC
P.O. Box 398
Austin, TX 78767-0398
Phone: (512) 853-8800
Date: 2009-05-07 JCH/MKB